

Infectious Diseases, Infectious Diseases

Nebraska Department of Health and Human Services, Division of Public Health

Lincoln, Nebraska

Assignment Description

Description of Supervision:

The Fellow will organizationally be located in the Office of Epidemiology and report directly to the Deputy State Epidemiologist.

Support Structure:

The Epidemiology Fellow will be protected from clerical and routine work, and will be expected to remain highly focused on specific epidemiologic projects. Because of the organizational structure of the agency, the Fellow will have ready access to personnel and data in the Vectorborne and Zoonotic Infectious Disease Surveillance Programs within the Epidemiology and Informatics Unit.

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Because of the tremendous public health and medical burden of infectious diseases, and because of the great potential for prevention and reduction of morbidity and mortality, Nebraska public health officials have prioritized the understanding of the epidemiology and control of infectious diseases in our population. As we increasingly focus our resources on controlling and reducing health care costs, we believe that all sectors of society will need and want a thorough understanding of the distribution and determinants of infectious diseases in our population. Our agency's goal is to be the leading provider of this information. We are extremely excited about the opportunity to supplement our current team with an Infectious Disease Epidemiology Fellow, and believe that such a resource will enable us to advance this agenda. For the qualified applicant we expect employment opportunities to be available at the completion of the fellowship.

The Nebraska Office of Epidemiology provides an ideal training opportunity to an Infectious Disease Epidemiology Fellow. This office is responsible for studying the epidemiology of reportable infectious diseases and investigating infectious disease outbreaks. The infectious disease epidemiology team consists of State Epidemiologist (Secondary Supervisor), a CDC Career Epidemiology Field Officer (CEFO, Primary Supervisor), EIS Officer, and 13 other program-specific epidemiologists.

The Fellow will work as part of this team with particular focus on vector-borne and zoonotic diseases. The team members are located in close proximity to each other in various parts of our integrated Health & Human Services agency. The training and skill development of the Fellow will be the primary

responsibility of the Deputy State Epidemiologist. All team members will be at the disposal of the Fellow to provide expertise in selected aspects of epidemiology and programmatic activities.

The Fellow will be authorized to access and analyze data sets/surveillance systems in all of these areas. The Vector-Borne Disease Section at NDHHS currently has 2 full-time and 1 part-time staff dedicated to the surveillance of mosquito and tick-borne diseases across the state. Some projects considered to be priorities have not been implemented because of limited capacity. Accordingly, the incoming CSTE Fellow will prove critical to enhancing surveillance capacity in this area.

Day-to-Day Activities

1) Develop an understanding of and familiarity with vector-borne and zoonotic disease surveillance datasets; 2) Refine data processing and data analysis skills; 3) Understand how to assess surveillance systems; 4) Analyze and interpret data; and 5) Prepare epidemiology reports. The training goals for the Fellow will be defined by Centers for Disease Control and Prevention (CDC)/Council of State and Territorial Epidemiologists (CSTE) Applied Epidemiology Competencies (AECs). At the completion of the fellowship, the Fellow will function as a well-qualified Tier 2, mid-level epidemiologist and will be highly employable in a wide range of public health settings.

Potential Projects

Surveillance Implement an improved tick-borne disease human surveillance system in Nebraska Activity

Nebraska has seen increases in incidence of some tick-borne diseases (e.g., Lyme Disease and Spotted Fever Group Rickettsia) in recent years, so a major priority surveillance project will be to implement an improved tick-borne disease human surveillance system for the State based on the findings of the initial system evaluation. As mentioned above, cases of tick-borne disease are currently investigated but limited information is currently captured electronically in NEDSS, so detailed analysis of tick-borne disease clinical and risk factor information is precluded until these data are compiled into a database. Thus, the CSTE Fellow will create a suitable database using Epi Info 7 or other application to enhance data entry and capture and will also conduct an analysis and review medical record data on cases through chart abstraction. The Fellow will then generate a report and map cases of tick-borne diseases for identification of potential hot-spots of disease in the state. Data gathered from this project will then be used to better understand the tick-borne disease burden in Nebraska, determine the need to improve our NEDSS investigation pages for improved surveillance going forward, and to help improve educational/preventive efforts.

Surveillance Evaluation of Nebraska's tick-borne human disease surveillance system Evaluation

As a proposed evaluation project, the CSTE Fellow will conduct an evaluation of Nebraska's tick-borne human disease surveillance system. Cases of tick-borne disease reported to the State are currently investigated to collect demographic, clinical, and risk factor information using hard-copy CDC case report forms. Limited information is currently captured electronically in NEDSS, so detailed analysis of tick-borne disease clinical and risk factor information is precluded until these data are compiled into a database.

Major Project Estimate rabies post-exposure prophylaxis (PEP) usage and appropriateness in Nebraska

According to the CDC, an estimated \$245 to \$510 million is expended annually in the US for rabies diagnostics, prevention, and control. Total costs are much higher when associated healthcare costs, animal control measures, and time lost are included. The number of rabies post-exposure prophylaxis (PEP) treatments given in the US annually are unknown but estimated to approach 50,000. In areas where rabies is enzootic, the number of PEP treatments is expected to be higher. Despite terrestrial rabies being prevalent in Nebraska, the amount of PEP given in the state has never been estimated, nor the costs which can exceed \$3,000 for a single series. To better estimate PEP usage in Nebraska and appropriateness, the Fellow will conduct a retrospective study for patients presenting to Nebraska hospitals and clinics. Using syndromic surveillance data collected from these facilities, the Fellow will identify visits where the primary complaint is a mammalian exposure (e.g., bite, scratch, handling, proximity) or where diagnostic codes indicate such an exposure. The Fellow will then work

through participating facilities to conduct a chart review of a representative sample to establish whether or not PEP use was appropriate as established by local recommendations and guidelines. Once completed, the Fellow will use the findings of this study to refine local guidelines and educational programs to improve the appropriateness of (or reduce the need for) PEP use as indicated.

Additional Project Investigate observed increase in annual number of reported histoplasmosis cases

Nebraska has also seen an increase in reports of histoplasmosis over the past three years. Prior to 2015, the average annual incidence was <20 cases/year but has since risen to 40 or more per year. Limited resources are currently available to thoroughly investigate. The CSTE Fellow will retrospectively study this observed rise in reported cases using existing NEDSS investigation data and augment with medical chart review as necessary. Analysis of these data will help better define the timing and distribution of cases throughout the state to determine if undetected clusters or outbreaks might have occurred or if the increases are the result of recent changes in laboratory diagnostics or reporting. Further, the Fellow will compile and analyze risk factor data including occupational risks if appropriate to identify possible explanations for the observed increases to improve efforts for prevention.

Additional Project Characterize the epidemiology of typical and atypical Enteropathogenic Escherichia coli (EPEC) infections in Nebraska

Globally, 1:10 child deaths result from diarrheal disease during the first 5 years of life. Enteropathogenic Escherichia coli (EPEC), mainly causing infantile diarrhea, represents one of at least 6 different categories of diarrheagenic E. coli with corresponding distinct pathogenic schemes. Limited information exists on the disease incidence and prevalence in the US. Since the development of the gastrointestinal PCR panel that allows for detection of EPEC, and implementation of this test methodology into Nebraska hospitals and reference labs, the Nebraska Department of Health and Human Services made the disease reportable in 2017 to better inform the epidemiology of EPEC. Interestingly, a majority of positive EPEC test results in Nebraska occur in adults, and not children. Further information is needed to characterize the epidemiology of typical and atypical EPEC infections in the state, as well as the role EPEC may play in gut dysbiosis and co-infection with other enteric pathogens. Specific objectives are as follows: 1) Refine the Nebraska Electronic Disease Surveillance System (NEDSS) database for capturing and following-up with EPEC cases occurring in Nebraska; 2) Obtain EPEC reference strains to develop a database (collaboration with NPHL); 3) Deploy a survey tool for capturing enhanced information about the disease from cases; and 4) Complete descriptive epidemiology of typical and atypical EPEC cases identified by the University of Nebraska Medical Center and other select healthcare facilities in Nebraska.

Preparedness Role

The Fellow will be expected to respond to acute and emergent problems related to infectious disease epidemiology, including emergency response activities related to naturally occurring and intentional events which have actual or potential impact on infectious disease morbidity/mortality. Nebraska's Bioterrorism Preparedness Program offers training and exercises to ensure Nebraska's preparedness in the event of an incident or attack involving biological, chemical, radiological or other agents of bioterrorism. The Fellow can access this training and participate in such exercises.

Additional Activities

The CSTE Fellow would also be expected to participate in outbreak investigations. Depending on the number and frequency, there will likely be opportunity for the Fellow to take the lead on an investigation.

Mentors

Primary

Bryan Buss DVM, MPH

CDC Career Epidemiology Field Officer (CEFO)

Secondary

Thomas Safranek MD

Nebraska State Epidemiologist